CLAIMS

1. An in-situ pile apparatus comprising:

a) a lowermost helical anchor having an upper, squared end portion, a cylindrical section, a drive shaft and a tapered transition section that joins the shaft to the cylindrical section;

b) a plurality of hollowed pile sections that are connectable end to end, a lowermost of the pile sections being connectable to the helical anchor at the helical anchor squared section;

c) connectors for connecting the pile sections together, wherein one squared end of one pile section fits inside of a squared end of another pile section.

2. The apparatus of claim 1 wherein each pile section has squared male and female end portions.

3. The apparatus of claim 3 wherein the pile sections have male squared end portions that are shaped to fit the female squared end portion of another pile section.

4. The apparatus of claim 1 wherein some of the pile sections carries circumferentially spaced radially extending soil displacement ribs.

5. The apparatus of claim 1 wherein at least some of the pile sections carry helical vanes.

6. A method of installing a piling system comprising the steps of:

a) thrusting a helical anchor into the earth;

b) connecting one or more pile sections to the helical anchor, each of the pile sections having squared end portions that are connectable with respective other squared end portions of other pile sections;

c) driving the anchor and pile sections with a rotary drive;

7. The method of claim 6 wherein each of the pile sections is shaped to connect to another pile section at a joint with a combined configuration that transmits torque.

8. The method of claim 6 wherein in step "b" each pile section has at least one squared end portion, and the squared end portions are joined together.

9. The method of claim 6 further comprising the step of filling the bore of a pile section with a filler material.

10. A method of installing a piling system comprising the steps of:

a) thrusting a helical anchor into the earth, the helical anchor having upper and lower end portions;

b) connecting a first pile section to the helical anchor at the upper end portion of the helical anchor wherein a shaped section of the helical anchor engages a correspondingly shaped section of the first pile section to form a joint that will transmit torque to the first pile section having a bore a generally cylindrical central section and upper and lower end portions, each having a shaped connector;

c) connecting a second pile section to the upper end portion of the first pile section, the second pile section having a bore, the first and second pile sections having connecting at a torque transfer joint that joins them;

d) driving the anchor and the first and second pile sections with a rotary drive tool.

11. The method of claim 10 wherein in step "a" the helical anchor includes a solid shaft having a helical vane.

12. The method of claim 10 further comprising the

step of filling the bore of at least one of the pile sections with a filler material.

13. The method of claim 10 further comprising the step of filling the bore of one of the pile sections with a grout filler material.

14. The method of claim 12 further comprising the step of removing all or part of the rotary drive tool before adding the filler material.

15. The method of claim 13 further comprising the step of removing all or part of the rotary drive tool before adding the grout material.

16. An in-situ pile apparatus comprising:

a) a lowermost helical anchor that is configured to be driven into a soil mass;

b) a plurality of hollowed pile sections that are connectable at joints that have open bores, a lowermost of the hollowed pile sections being connectable to the top of the anchor;

c) a rotary drive system for installing the helical that includes pile end portions that are shaped so that one end portion fits inside anchor and pile sections of an end portion of an adjacent pile section.

17. The apparatus of claim 16 wherein the drive system includes a rotary drive tool with an enlarged diameter section that occupies a pile section end portion during use.

18. The apparatus of claim 17 wherein the pile sections have end portions that are shaped to fit the end portion of another pile section in telescoping fashion.

19. The apparatus of claim 16 wherein each of the pile sections carries a plurality of circumferentially spaced radially extending soil displacement ribs.

20. The apparatus of claim 17 wherein the pile end

portions are not circular in shape.

21. The apparatus of claim 17 wherein the pile end portions are squared.

22. A multi-section pile apparatus, comprising:

a) a lowermost anchor that is configured to be driven into a soil mass by rotation, the anchor having a solid shaft and a helically threaded vane portion attached thereto;

b) a plurality of pile sections that are connectable end-to-end at non-annular joints, the pipe sections and joints having hollow bores, a lowermost of the pile sections being connectable to the top of the anchor;

c) rotary drive that fits inside of the end of the upper pile section, the drive including an enlarged tool that snugly fits the bores at a non-annular joint; and

d) wherein the joints are configured with non-annular surfaces that enable torque to be transmitted from the rotary drive to the pile sections.

23. The apparatus of claim 22 wherein the pile sections have end portions that are shaped to fit a squared end portion of another pile section in telescoping fashion.

24. The apparatus of claim 23 wherein each of the pile sections carries a plurality of circumferentially spaced radially extending soil displacement ribs.

25. A multi-section pile apparatus, comprising:

a) a lowermost anchor that is configured to be driven into a soil mass by rotation, the anchor having a shaft with a helically threaded vane portion and an upper tapered transition section;

b) a plurality of pile sections that are connectable end-to-end at joints, the pipe sections and

joints having hollow bores, a lowermost of the pile sections being connectable to the top of the tapered transition section of the anchor;

c) connectors that include enlarged sections that snugly fit together at the bores of the joints between respective pile sections, each joint being occupied by non-annular section of another pile section;

d) wherein the joint non-annular surfaces enable torque to be transmitted from the drive to the pile sections; and

e) the connections including a connection between the lower end portion of one of the pile sections and an upper end portion of the anchor.

26. The apparatus of claim 26 wherein the enlarged diameter section is a solid structure that occupies a joint open bore during use.

27. The apparatus of claim 26 wherein the pile sections have end portions that are shaped to fit the end portion of another pile section in telescoping fashion.

28. The apparatus of claim 26 wherein each of the pile sections carries a plurality of circumferentially spaced radially extending soil displacement ribs.